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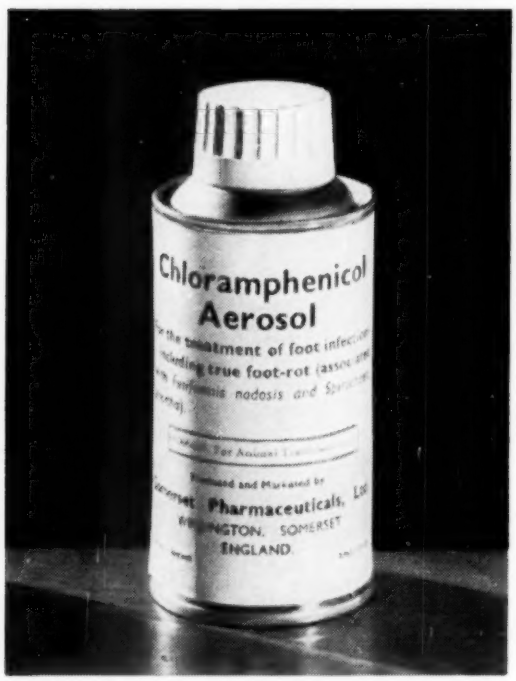

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Treatment of Conjunctivo-keratitis of Cattle and Sheep with Ethidium Bromide

Part I.—Infectious Bovine Keratitis (I.B.K.)

BY

B. S. COOPER

**Boots Pure Drug Co. Ltd., Research Department,
Veterinary Science Division, The Priory,
Thurgarton, Notts.**

SUMMARY.—0.5 per cent. ethidium bromide eye ointment was compared with chloramphenicol, chlortetracycline, oxytetracycline and penicillin in 7 outbreaks of I.B.K. during the summer of 1959. All treatments were equally effective, particularly when used early in infection. At a later stage healing proceeded by vascularisation but in all cases treatment halted the progressive corneal invasion.

I.B.K. was produced in young calves and yarded bullocks by the instillation of a Moraxella bovis *suspension into the conjunctival sac. Ethidium treatment for 4 days cleared infected eyes of* M. bovis *but untreated eyes can harbour the organism for up to 5½ months.*

Introduction

WHEN investigating the rôle of "lumpy bodies" seen in smears of sheep conjunctivae, Dickinson and Cooper (1959) found that a 0.5 per cent. aqueous solution of ethidium bromide (2:7-diamino-9-phenyl-10-ethylphenanthridinium bromide) cleared these bodies from the limited number of eyes tested. This solution and a corresponding eye ointment were also used against contagious conjunctivo-keratitis infection in sheep and were found to be as highly effective as chlortetracycline (Cooper & Dickinson, 1960).

Previous laboratory tests had shown that ethidium bromide had some antibacterial activity *in vitro* (Croshaw, 1957), and discs impregnated with a 25-microgram per ml. solution created appreciable zones of inhibition against cultures of *M. bovis* on ox-blood agar plates. This organism has been associated with I.B.K. in Great Britain by Watt (1951), who reported an outbreak in Scotland, and more recently by Faull and Hawksley (1954), who investigated 7 outbreaks in Berkshire and Oxfordshire.

Ethidium bromide, formulated as a 0.5 per cent. eye ointment or aqueous solution produced no local or general toxic effects when used on normal calf eyes once or twice daily for 5 days. Previously, extensive use on sheep eyes had not produced any significant reaction.

During July, 1959, reports were received from various parts of England of serious I.B.K. outbreaks and with the foregoing evidence it was considered rational to try ethidium against this disease in the field.

Field Observations and Procedure

Ten separate farm outbreaks were visited and 7 of these were selected as suitable for further investigation (see Table I).

Although the severity of eye damage and particularly the rate of spread varied enormously between farms, in general the pathological signs were as described by Faull and Hawksley (1954) and Formston (1954). At the first visit, conjunctival swabs from affected eyes were immediately cultured on to 10 per cent. ox-blood agar plates and *M. bovis* was recovered from 4 of 6 outbreaks (haphazard treatment had been applied on the 2 other farms and the sampled eyes may have been treated earlier). Swabs were not taken on farm 5. On 2 farms (6 and 2) *M. bovis* was also recovered from eyes showing a mild conjunctivitis and excessive lachrymation only, which did not progress to a keratitis. Further conjunctival swabs were taken in the autumn from 4 of the 7 farms.

Ethidium bromide 0.5 per cent. eye ointment was

TABLE I
TREATMENT OF I.B.K. OUTBREAKS USING ETHIDIUM BROMIDE

Farm and date of 1st examination	Type of cattle affected	*M.bovis* isolation	Eyes at risk (*i.e.* animals in direct or indirect contact)	Eyes affected at 1st examination	Type of treatment & no. of eyes			Results after 1 week	Autumn *M.bovis* isolation	Remarks
					Ethidium bromide	Other treatment eyes	Control or untreated suspects			
1. July 2nd	Grazing stock 5-18 months old	− − −	26	17	9	A. 8 eye pellets (once daily only)	None	No change in established cases	8 all − − −	Sporadic cases in previous years may have been I.B.K.
2. July 27th	Friesian dairy cows	+ + +	50	14	4	None	4	1 control eye much worse. 4 treated no change	10 1 only + + +	6 eyes too far advanced 1 case in autumn arose after 4 months free from cases.
3. July 1st	Ayrshire dairy cows following infection of grazing young stock	− − −	80	49	22	A. 7 eye pellets B. 16	4	Early infections halted. No change in established cases	N.D.	Sporadic cases through previous winter in housed young stock.
4. July 8th	A.A. beef cows and calves at foot	+ + +	50	11	4	A. occulentum 3	Occulent base alone 4	2 control eyes much worse. Treated no change or improved	N.D.	First cases in herd noticed in January.
5. July 26th	Friesian heifers 2 years old at pasture	N.D.	40	7	4	C. 3	None	No change in established cases. Further cases promptly halted	N.D.	Many severe cases at first examination.
6. July 31st	Ayrshire dairy cows and grazing 18-month-old heifers	+ + +	230	37 (over 4 months)	22 (twice daily for 2 days only)	C. 15	None	Established cases slowly healed. Fresh cases promptly halted and some relapsed and were retreated	30 all − − −	8 relapses about 72 hours after end of treatment. Ethidium—3 Chloramphenicol—5
7. July 8th	Ayrshire dairy cows and grazing heifers	+ + +	374	186 (over 4 months)	131	D. 55	None	No change in established cases. Fresh cases promptly halted. Some re-infection and were retreated	30 all − − −	11 reinfected, fortnight to 1 month after treatment. Ethidium—7 Penicillin—4.

KEY: N.D. = Not done. + + + = Positive isolation. − − − = no isolation.
A = Oxytetracycline (Terramycin ; Pfizer). B = Chlortetracycline ointment (Aureomycin ; Cyanamid).
C = Chloramphenicol ointment (Dapsetyn or Alficetyn ; Allen & Hanburys). D = Penicilin intramammary ointment 100,000 I.U. (Boots).

used in these 7 outbreaks and compared with chloramphenicol, chlortetracycline, oxytetracycline or penicillin.

All affected eyes were treated regardless of the stage of infection for 4 (or 5) days. Outlying animals were treated once daily but dairy cows and housed stock, twice daily. All treated eyes were re-examined a week later while any fresh cases were treated by the stockman as they arose. In general, farmers would not allow control eyes to go untreated, but a few were left and also certain eyes which on examination may have been showing very early signs.

Field Results (Table I)

There was no difference between results of treatments. When these were started as soon as the corneal ulcer or opacity was evident, then healing proceeded quickly without visible pannus. If the eye damage was already extensive then treatment appeared far less spectacular and healing of the corneal lesion proceeded by vascularisation, but treatment at any stage stopped further active corneal damage.

Of 5 actively infected eyes left untreated, 3 became worse within 4 days and 2 remained the same. None of 3 eyes showing lachrymation and left untreated showed further signs of infection. Four other eyes with corneal scars only, remained unchanged.

On farm 6 where the treatments were applied for

2 days only, 8 of 37 eyes relapsed to their former severity approximately 72 hours after the last treatment. On farm 7, 11 of 186 treated eyes showed active signs 14 days to 1 month after the last treatment. Because of careful twice-daily observation in this herd, affected eyes were being treated early in infection and this may have prevented the production of active immunity so allowing early reinfection.

Of 70 conjunctival swabs collected in November, when all the outbreaks had ceased, only 1 yielded *M. bovis*. This was from a heifer on farm 2 which had shown clinical signs on the day previous to the visit.

Transmission of the Disease—Experimental Materials and Methods

M. bovis *Strains*

Strain I was received as freeze-dried material from Mr. M. B. Hawksley but all other strains were isolated from affected eyes in the field.

Strain II was recovered from a dairy cow on farm 7 (see Table I) when the outbreak was most severe, and strain III from yarded bullocks on a nearby farm in Oxfordshire.

A sporadic case in a dairy heifer on a Nottinghamshire farm yielded strain IV which produced flat-topped colonies on ox-blood agar plates.

Strains V and VI were isolated from yearling animals on the same Trent valley farm during the winter of 1959-60.

When conjunctival swabs yielded typical colonies of *M. bovis* these were transferred from ox-blood agar plates on to corresponding slopes and incubated for a further 24 hours at 37° C. The growth was washed off with 0.9 per cent. saline, spun down, washed twice and then re-suspended.

Laboratory Animals

A 0.9 per cent. saline suspension of strain II was dropped on to the eyes and into the conjunctival sacs of mice, guinea-pigs, pigs, a rabbit, 2 sheep and 2 cockerels with negative results. The experiment was repeated twice with other strains of *M. bovis* always freshly isolated, encapsulated and in the smooth phase. Neither conjunctivitis nor keratitis was ever produced and *M. bovis* was not isolated.

Experiment I (using 3-month-old calves)

This was set up to follow the course of the experimentally produced untreated condition. Three calves, aged 3 months, were housed in a fly-free loose-box with constant artificial light. Repeated conjunctival swabs had not yielded *M. bovis* nor had

TABLE II
TRANSMISSION OF I.B.K.—EXPERIMENT 1 USING 3-MONTH-OLD CALVES

Calf No.		Infected *M. bovis* II. August 6 (Day 0.)	Day 4	Day 6	Day 8	Day 9	Day 11	Day 13	Day 14	Day 19	Day 31	Day 36
	L.	Control										* N.D. NN.D.
53	R.	Infected	* S − − −	* S − − −	* S − − −	* N.D. N.D.	* N.D. N.D.	* N.D. + + +	* N.D. + + +	* N.D. N.D.	* N.D. + + +	Thick central opacity. No blood vessel remnants seen
	L.	Control										
154	R.	Infected		* S − − −	* S − − −	* N.D.	* N.D. N.D.	* N.D. + + +	?* N.D. + + +	* N.D. N.D.	* N.D. + + +	Several converging ulcer opacities with faint vascularization only.
	L.	Control			Swab ↓ Infected	* S + + +	* N.D. + + +	* N.D. + + +	* N.D. + + + Treated →		* N.D. − − −	* N.D. N.D.
167	R.	Control					Discharge ↓ Infected		Normal + + +	* N.D. + + +	* N.D. + + +	* N.D. Last N.D. + + + 10/2/60
Calf 2	L.								Pool of infective eye discharge		* N.D. − − −	* N.D. Last N.D. + + + 23/10/59
	R.								Filtrate of above.			

KEY: * = Positive clinically; + + + = Positive isolation; S = Positive smear; − − − = No isolation; N.D. = Not done.

I.B.K. ever been seen on the experimental farm where the calves were reared.

One eye, of each of 2 calves (Nos. 53 and 154, see Table II), was infected with a 0.9 per cent. saline suspension of strain II by dropping on to the cornea and into the conjunctival sac. The uninfected eyes and the third calf (No. 167) served as controls. Both infected eyes developed typical signs of I.B.K. at 4 days and 6 days with excessive lachrymation, congestion of scleral conjunctival blood vessels, eyelid oedema, corneal opacity, blepharospasm and photophobia. At this stage the calves resented handling. By the second day a corneal ulcer and/or opacity was always visible and this stained deeply with 2 per cent. fluorescin. Swabs from these eyes and the corresponding nostril yielded *M. bovis* intermittently for up to 2 months. It was later apparent that swabs should be saturated with 0.9 per cent. saline for sampling and some early failures in isolation may have been due to bad technique, as smears stained by Gram or Giemsa showed morphologically typical *M. bovis*.

On day 8 a moistened swab was passed from 154 right eye (R) directly on to 167 left eye (L) with slight rubbing of the conjunctiva and within 24 hours this eye showed typical signs of I.B.K. Two days later (day 11) infected discharge was passed direct from 167L to R and 8 days later this eye showed typical I.B.K. with a positive isolation.

On day 14 another calf (No. 2) from the same source was brought into the loose-box directly after infection of its left eye with a pool of infective eye discharges from 53R and 167L, and of its right eye with a gradocol filtrate (0.97μ) of the same pool. Seventeen days later (day 31) typical signs of I.B.K. appeared in the left eye only.

Swab samplings from the conjunctival sacs and from just within the nares were taken at intervals for the next 7 months, during which time the calves were kept in isolation. *M. bovis* was isolated last from eye 2L on October 23rd, 1959 (approximately 2 months from the day of infection), and from eye 167R on February 10th, 1960 (nearly 6 months from the day of infection).

Experiment II (using 18-month-old bullocks)

This was carried out during the winter of 1959-60 in an attempt to provide simultaneously many infected eyes for comparative treatment studies. Seventeen Hereford cross bullocks aged 18 months were housed in 2 loose-boxes with outside concrete runs. All conjunctival swab samples had been negative for *M. bovis* twice at 4-day intervals. On January 7th, 6 eyes were infected with the sub-cultured strain II suspended in 20 per cent. ox serum broth and no clinical cases were produced within 3 weeks. This medium was tried as having greater tenacity and more nearly approaching the consistency of infective eye discharges. On January 18th a further 7 eyes were infected with a fresh field isolate, strain V. This produced 1 positive case on day 15 from which *M. bovis* was recovered regularly for the next 10 weeks although the clinical signs quickly subsided and healing begun on day 18 (3rd day). On February 9th another 10 eyes, 5 of which had withstood strain II challenge 1 month previously, were infected with a concentrated suspension of strain V which had been freeze-dried as a fresh isolate. Meat broth was used here and afterwards for suspending the culture in view of possible serum antibody effect. The challenge produced 2 cases on day 15 (both in previously unchallenged eyes), 1 of which was treated with ethidium bromide 0.5 per cent. eye ointment once daily for 4 days, and the other left alone. Both eyes yielded *M. bovis* on day 15 but only the untreated eye was positive when sampling was repeated 3 weeks later. An attempt was made to passage strain V quickly through infected eyes in the hope of increasing its virulence for these older cattle but of 10 further eyes challenged only 1 became clinically positive on day 10. One uninfected control eye showed spontaneous infection with clinical symptoms and this was treated with ethidium bromide. The only other clinical case arose in an eye 35 days after its challenge with strain V, and healing began spontaneously within 48 hours.

Experiment III (using 4-month-old calves)

Four calves, approximately 4 months old and housed in 2 loose-boxes, were made available shortly before slaughter. Again it was planned to produce simultaneously as many infected eyes as possible.

A concentrated suspension of strain VI in meat broth was used on all 8 eyes by simple instillation (see Table III). Three clinical cases were produced on day 7. One of these was left as an untreated control, another treated once daily for 4 days with 0.5 per cent. ethidium bromide eye ointment and the third similarly treated but starting on day 8. Two further cases arose (on day 9 and day 11), the first of which was left untreated and the second treated once daily for 3 days with 2.5 per cent. ethidium bromide powder in a starch and mannitol base. On day 14 all eyes were swabbed and then all treated once daily for 5 days with ethidium bromide powder. All eyes were finally swabbed 2 days after treatment had finished when none yielded *M. bovis*.

Results from Experiments

The results of infection in Experiment I are summarised in Table II, showing that clinical I.B.K. was produced by a culture of *M. bovis* strain II in 4 and 6 days, by infective eye discharge in 8 and 17 days and by an infective swab when rubbed on the conjunctiva in 24 hours. Jackson (1953) recorded incubation periods from 18 hours to 17 days, although 2 to 3 days was more normal.

The susceptibility of individual animals varied enormously. In calf 167, on the first day a corneal opacity and/or ulcer was present which developed to complete corneal opacity with great thickening in 4 days, and in this severe case corneal vascularisation on the dorsal border was apparent by the fifth day. Healing in this manner was slow and protracted with temporary blindness. In contrast to this, eye 53R was almost healed in 32 days, leaving only a central faint corneal opacity and 53L had healed to the same degree in 3 weeks.

Of 37 attempted eye infections made on 18-month-old bullocks, only 5 produced clinical signs, together with 1 uninfected control eye which showed signs of I.B.K. after nearly 3 months' exposure to natural contact infection. *M. bovis* was recovered on 1 or more occasions for up to 10 weeks from these 6 and from a further 6 eyes which never showed any clinical change. The 2 eyes which were treated once daily for 4 days with 0.5 per cent. ethidium bromide eye ointment, no longer yielded *M. bovis* when sampled at intervals afterwards, although comparable untreated control eyes did. Once severe corneal ulceration was produced, then treatment made little or no difference to the course of healing which progressed by vascularisation, but no further corneal damage occurred.

The difference between treated and control eyes was clearly demonstrated using the younger calves in Experiment III. On day 14, 3 treated eyes were all negative for *M. bovis* and had fading pin-point corneal opacities, in comparison with 2 untreated control eyes showing active conjunctivo-keratitis from which *M. bovis* was isolated in each case. Following 5 once-daily treatments with ethidium bromide powder, *M. bovis* could no longer be isolated.

It is hoped to publish a description of the pathology at a later date.

Discussion

With herd outbreaks which seem more common in the summer, or with sporadic cases arising during the winter months, infectious bovine keratitis is characterised by corneal damage with opacity and the presence of *M. bovis* in eye discharges.

Reports from the field suggest that I.B.K. is becoming more common and this may be due partly to the increased traffic in calves and store cattle. Faull and Hawksley (1954), suggested that "a natural resistance may develop with increasing age" and this appears generally to be the case. However, on farm 7 a serious outbreak amongst dairy cows may have been produced by a combination of 3 factors: (a) a virulent strain of organism, (b) a susceptible herd, and (c) conditions ideal for a quick spread (bail milking system with collecting yard).

In all cases where effective treatment was used on infected eyes, progressive corneal invasion was halted and natural healing allowed to commence. Under the trial conditions, ethidium bromide was found to be as effective as chloramphenicol, chlortetracycline, oxytetracycline and penicillin. It is most important that treatment should be started immediately corneal lesions are visible as in this case natural resolution occurs without pannus. If treatment is delayed the greater damage demands healing by vascularisation which is a lengthy process. Both field and experimental work showed that application of ethidium bromide once or twice daily for 4 or 5 days was sufficient to clear *M. bovis* from eyes and there seems no reason for further treatment. Prolonged local therapy with an antibiotic has been used widely in the field against I.B.K. and this form of application might possibly stimulate the development of resistant strains of *M. bovis*. In these cases the chemotherapeutic ethidium bromide might be

TABLE III
TRANSMISSION OF I.B.K.—EXPERIMENT III USING 4-MONTH-OLD CALVES. TREATMENT WITH ETHIDIUM BROMIDE

	Calf No.		Infected *M. bovis* VI April 25th 1960 (day 0)	Day 7	Day 8	Day 9	Day 11	Day 14: All eyes treated once daily for 5 days ethidium bromide 2·5 per cent. powder	Day 21	Day 23 at slaughter
Box 1.	B4	L.	Infected			• +++	Untreated Control	• +++	---	N.D.
		R.	Infected				• Treated→ +++Powder	?• ---	---	N.D.
	B3	L.	Infected	• +++	Untreated Control			• +++	---	---
		R.	Infected					+++	---	N.D.
Box 2.	B2	L.	Infected			Muco-Purulent Discharge		+++	---	---
		R.	Infected	• +++	Treated→ Ointment			---	---	N.D.
	ET41	L.	Infected	• Treated → +++ Ointment				---	---	---
		R.	Infected					+++	---	N.D.

KEY: • = Positive clinically. +++ = Positive isolation. --- = No isolation. N.D. = Not done.

especially useful for its quick-clearing action. The carrier state must be abolished, and to this end, even doubtful clinical cases ought to be treated as it was shown in Experiment II that 6 carrier eyes did not show clinical signs.

The variation in response to experimental infection may be due to factors concerning the animal, or the inoculum. Observations from the field suggest that older cattle may be more resistant by virtue of their age alone or because of naturally acquired immunity.

Certain strains of *M. bovis* exhibit colony differences, *e.g.* flat topped, rough and smooth, more or less mucoid, and there may well be fundamental strain differences apart from virulence variation. If ox serum is used for culture or in the inocula then antibodies may be present. The failure to infect bullocks in Experiment II with *M. bovis* strain II may have been due to the age of the cattle, to the ox serum medium, or to the strain having been repeatedly subcultured. If subculturing a strain does lower its virulence to the eye, this might be used to advantage in attempts at local vaccination but much work would need to be done on this aspect of the problem. There is, nevertheless, a very definite place for any effective vaccine in the control of I.B.K. Such work is hindered by the lack of a suitable laboratory host. All the species tested, except cattle, were refractory to artificial infection, although Gallagher (1954) produced corneal keratitis in 5 out of 6 mice by dropping *M. bovis* cultures on their eyes.

Excessive lachrymation is a common sign shown by grazing stock during the summer and is commonly attributed to fly irritation. Mild conjunctivitis may be present but such eyes of young stock on the experimental farm here have never yielded *M. bovis* (36 swabs). Conjunctival smears stained with Giemsa did not show cellular inclusions.

During the early spring of 1960, an outbreak of conjunctivitis in housed calves up to 5 months old was characterised by excessive lachrymation, vascular congestion and some photophobia. *M. bovis* was never recovered from repeated samplings and no keratitis appeared but smears of the conjunctiva stained with Giemsa showed intracytoplasmic inclusions. This condition may be similar to that described by Blakemore (1947). Treatment was not attempted. Pook (1951) recorded an outbreak of conjunctivo-keratitis in young calves where the symptoms described were suggestive of I.B.K. but no *M. bovis* was isolated and pleomorphic inclusion bodies were seen in conjunctival smears stained by Giemsa.

There is no experimental evidence to suggest any association between the conjunctivitis in young cattle and the severe conjunctivo-keratitis of I.B.K. affecting stock of all ages.

Acknowledgments.—The original culture of *M. bovis* (strain I) was kindly supplied by Mr. M. B. Hawksley and I am indebted to Miss L. H. Aynsley for valuable bacteriological help. The farm outbreaks were reported to me by veterinary surgeons in practice with whose support the field trials were carried out, and in particular I would thank Mr. W. B. Faull for his co-operation. I am also grateful for advice from Mr. W. M. Brownlie and Dr. L. Dickinson who helped in the preparation of this paper. Mr. K. H. B. Wood of Pfizer Ltd. kindly supplied the Terramycin eye ointment and pellets.

References

BLAKEMORE, F. (1947). *J. comp. Path.* **57.** 223.
COOPER, B. S., & DICKINSON, L. (1960). *Vet. Rec.* **72.** 216.
CROSHAW, B. (1957). Personal communication.
DICKINSON, L., & COOPER, B. S. (1959). *J. Path. & Bact.* **78.** 257.
FAULL, W. B., & HAWKSLEY, M. B. (1954). *Vet. Rec.* **66.** 311.
FORMSTON, C. (1954). *Ibid.* **66.** 522.
GALLAGHER, C. H. (1954). *Aust. Vet. J.* **30.** 61.
JACKSON, F. C. (1953). *Amer. J. vet. Res.* **14.** 19.
POOK, H. L. (1951). *Vet. Rec.* **63.** 445.
WATT, J. A. (1951). *Ibid.* **63.** 98.

GAME BIOLOGY INFORMATION CENTRE

At a meeting of the Game Conservation and Diseases section of the Conseil International de la Chasse at Lausanne, Switzerland, on May 12th to 13th, 1960, plans were discussed to collate all information on the subject of game biology (in its widest sense) in Europe. Dr. G. Bouvier, Director of the Institute Galli-Valerio, Lausanne, has agreed to collect all the relevant information either for publication twice a year in review form, or for filing at the International Centre for Scientific Research in Paris. It is requested that for a start all papers, booklets, reports, etc., published since January 1st, 1960, should be forwarded to The Game Research Association, 7-8, Great Winchester Street, London, E.C.2, which will act as a clearing house for the time being for British publications. All contributions should be marked "For Information Centre."

THE CATALOGUE OF VETERINARY FILMS

Professor Dr. L. de Blieck, Deputy Secretary of the Permanent Committee of the World Veterinary Association, who has compiled a catalogue of veterinary films, is most anxious to obtain details of any films which deal with the diseases of pigeons and cage-birds. The present list is deficient in this respect, and members of the profession who have such films available are asked to send details to Dr. de Blieck at Biltstraat 168, Utrecht, Netherlands. In particular, the compiler would like to have information on the subject of the film, whether it is 16 mm. or 35 mm., and whether it is in colour or in black-and-white, together with a note of the running time.

IN PARLIAMENT

Pedigree Livestock

On Tuesday, July 12th, MR. DRAYSON asked the President of the Board of Trade if he will give financial assistance to breed societies or rearers of pedigree livestock so that they can participate in overseas agricultural exhibitions with the object of promoting the sale of pedigree British livestock.

MR. ERROLL: My right hon. Friend is always ready to consider requests from industries to supplement their own efforts in staging collective exhibits at overseas exhibitions.

Observations on an Outbreak of Parasitic Bronchitis Initiated by Vaccinated Carrier Calves

BY

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Department of Veterinary Preventive Medicine,
University of Liverpool

SUMMARY.—Five grazing calves on a reseeded pasture became infected with D. viviparus *following the introduction of 4 calves which had been vaccinated with irradiated larval vaccine and had subsequently grazed infected pasture on another farm. The course of the infection was studied on two paddocks by means of faecal larval counts, estimation of infective larvae on the herbage and complement fixation tests on sera using a heated whole worm antigen. Four of the five calves died. The epidemiological significance of the results is discussed.*

Introduction

As a result of their immunological studies on *Dictyocaulus viviparus*, Jarrett, Jennings, McIntyre, Mulligan and Urquhart (1957) produced a vaccine consisting of X-irradiated infective larvae. The effectiveness of the vaccine has been assessed under both experimental challenge and field conditions (Jarrett *et al.*, 1958a, b, 1959). The fact that vaccinated calves after exposure to natural infection can develop patent infections and thus act as carriers in transferring infection from one pasture to another was reported by Cornwell (1959) in a short note and the present paper records the serological and parasitological observations carried out following this reported transfer of infection.

Experimental Animals and Methods

Six Ayrshire bull calves were purchased at 3 days old and reared artificially indoors in loose-boxes which were cleaned out every other day. They were weaned onto hay and concentrates at 2 months old and turned out to grass at the beginning of June, 1959. The pasture was a newly sown ley which prior to reseeding had not grazed bovine stock or been manured with cattle faeces for at least 8 years.

Four calves vaccinated with 2 doses of irradiated larval vaccine* grazed infected pasture on a local farm for 2 to 4 weeks before being transferred to the Field Station on June 20th, at which time their faeces were negative for lungworm larvae, and they were turned onto the pasture being grazed by the 6 unvaccinated calves.

Regular faecal larval counts were carried out on 10 grammes of rectal faeces by Baermann extraction overnight and withdrawing sufficient fluid to fill a centrifuge tube, which was then spun at 1,500 r.p.m. and the sediment examined on a microscope slide. When the larvae were numerous their number was estimated by counting a representative sample of the resuspended deposit. Faecal larval output is expressed as larvae per gramme of faeces (1/g.).

Herbage samples were collected weekly and examined for infective larvae by the method of Parfitt (1955), the results being expressed as larvae per lb. of herbage (1/lb.).

The worms in the lungs at *post-mortem* examination were collected by the method of Michel (1954) and the numbers estimated by weighing the worms after drying between filter paper and counting the number in a 1-gramme sample. The immature worms were estimated as a percentage of the total and comprised those measuring 1 cm. and less.

Complement-fixation tests were carried out as described by Cornwell and Michel (1960).

* "Dictol," Allen & Hanburys Ltd.

Results

Two of the vaccinated calves were found to be passing larvae on June 30th, 10 days after arrival, and the other 2 commenced to excrete larvae 3 and 10 days later, respectively. On July 2nd the pasture was divided into 2 paddocks. On paddock A were put calves 1008, 1012 and 1010 along with 2 vaccinated calves. On paddock B calves 1011 and 1014 were left alone. The remaining 2 vaccinates and 1 unvaccinated calf were brought indoors and took no further part in the experiment.

Paddock A

The course of the infection on paddock A is shown in Fig. 1. The herbage infestation reached a detectable level 4 weeks after the vaccinates arrived and then rose quickly as a result of the larvae passed by the unvaccinated calves from 31 to 38 days onwards. Throughout the period of larval excretion the herbage infestation closely reflected the numbers of larvae being passed onto it. Severe husk developed in the unvaccinated calves and No. 1012 died at the height of the infection when its faecal larval count was 2275 1/g. At *post-mortem* examination, 3,700 worms were recovered from the lungs, 35 per cent. being immature. Calf 1010 was housed from the 7th to the 11th week and was re-exposed at the peak of the herbage infestation. The larval output of this calf reached its peak while indoors and the subsequent fall continued for 4 weeks after its return to pasture. The larval count then began to increase and the calf died (Fig. 1). At *post-mortem* examination 286 worms were recovered but lung damage was not marked. Calf 1008 survived its severe infection and was housed 4 weeks before the patent period ended (Fig. 1).

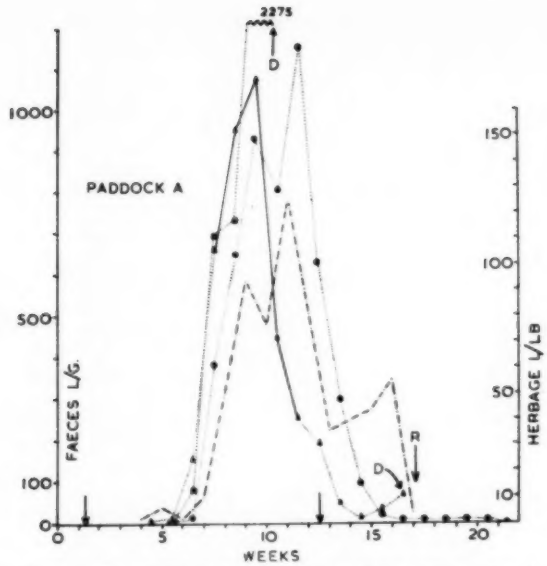

FIG. 1.—The course of the infection in the 3 calves on paddock A.

●.....● = Larvae in the faeces of Calf 1008.
▲.....▲ = " " " " 1010 at pasture.
▲——▲ = " " " " 1010 indoors.
■.....■ = " " " " 1012.
.—.—.—.— = Larvae on herbage.
D = Died. R = Calf 1008 removed from pasture.
↓ to ↓ = Period for which vaccinates were known to be excreting larvae on to the pasture.

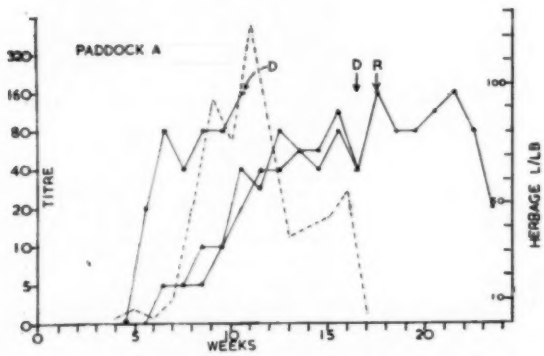

FIG. 2.—Antibody titres of 3 calves grazing paddock A.

●——● = Titre of Calf 1008.
▲——▲ = " " 1010.
■——■ = " " 1012.
.—.—.—.— = Numbers of larvae on herbage.
D = Died. R = Removed from pasture.

The complement-fixing antibody response of these 3 calves is shown in Fig. 2. The first response was detected at 5 to 6 weeks and although No. 1012 showed a fairly steep rise a peak response had not been obtained when the calf died. Calves 1008 and 1010 had very similar titres although the former survived and the latter died. The titre of No. 1008 reached a peak in 113 days and after remaining fairly level for 5 weeks fell to a low level after the calf was housed.

The 2 vaccinates on this paddock excreted larvae for a total period of 11 weeks and at a level never exceeding 8 1/g., they showed only mild symptoms of husk. The full details of these calves are reported separately (Cornwell, 1960).

Paddock B

The vaccinates grazed this part of the pasture for 12 days before it was fenced off and calves 1011 and 1014 were left on it alone. The herbage infestation produced by the vaccinates was not detectable but the unvaccinated calves became infected and began to excrete larvae 38 days after the arrival of the carrier calves. A week later the herbage count had risen to 44 1/lb. and a peak of 416 1/lb. was reached 2 weeks later. Both calves succumbed to this exceedingly heavy infection (Fig. 3).

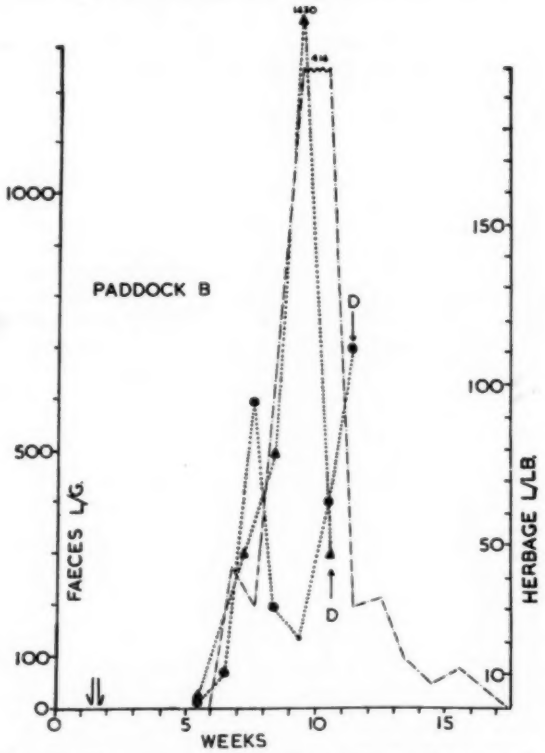

FIG. 3.—The course of the infection in the 2 calves on paddock B.

●.....● = Larvae in faeces of Calf 1011.
▲.....▲ = " " " 1014.
.—.—.—.— = " on herbage.
D = Died.
↓↓ = Period for which vaccinates were known to be excreting larvae on to the pasture.

The antibody titres of these two calves are shown in Fig. 4. Antibodies were first detected at the same time as the herbage began to show positive counts, *i.e.* one week after the calves commenced to excrete larvae. Titres of 80 and 160 had been reached before

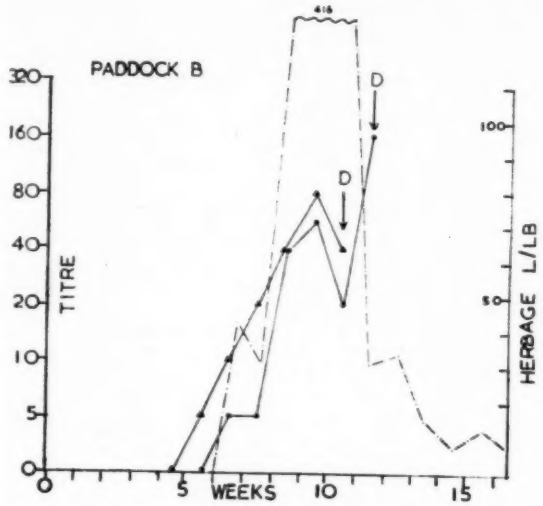

FIG. 4.—Antibody titres of 2 calves grazing paddock B.
●——● = Titre of Calf 1011.
▲——▲ = ,, ,, 1014.
.—.—.—. = Numbers of larvae on herbage.
D = Died.

TABLE I
DATA RELATING TO THE 5 UNVACCINATED CALVES. TIME IS CALCULATED FROM THE ARRIVAL OF VACCINATED CALVES ON THE PASTURE

Calf and paddock	Days to onset of titre	Days to peak titre	Days to excretion of larvae	Patent period (days)	Days to death	Titre at death	Worms in lungs*
1008 A	45	113	38	112	—	—	—
1010 A	45	—	31	—	118	40	286 (5)
1012 A	38	—	38	—	75	160	3,700 (35)
1011 B	45	—	38	—	79	160	2,400 (5)
1014 B	45	—	38	—	72	40	8,000 (25)

* = Figures in brackets represent percentage of worms present as immature forms.

death but it is not apparent whether the peak response had occurred by this time.

The data relating to the 5 calves on both paddocks is summarised in Table I.

Discussion

The faeces of the vaccinated calves were negative for lungworm larvae on the day of arrival and positive 10 days later and so they could have begun to excrete larvae at any time during this period. Assuming a period of 5 days for the larvae in the faeces to become infective and a further 24 days for ingested infective larvae to produce a patent infection, the shortest time within which the unvaccinated calves could begin to excrete larvae would be between 29 and 39 days after they were joined by the vaccinates. In fact the actual time taken was 31 days in 1 calf and 38 days in the other 4 calves, which suggests they acquired the infection from larvae passed by the vaccinates within a few days of their arrival. By the same reasoning, had the pasture been infected when the unvaccinated calves were first turned onto it at the beginning of June, larvae could reasonably have been expected to appear in the faeces by the end of June, instead of July 20th.

On paddock A the carrier calves produced a herbage count of 2 1/lb. four days before the first calf (No. 1010) was found to be excreting larvae. Prior to this the level of infection on the herbage was undetectable (less than 1 1/lb.). Evidently the acquisition of small numbers of larvae during the first 2 or 3 weeks did not prevent the calves developing severe disease when the herbage counts rose to a high level. Michel and Parfitt (1956) and Michel (1957) found that calves which experienced a mean herbage infestation of less than 1 1/lb. over the first 9 days of exposure were subsequently resistant to high levels if the rate of uptake of larvae during this period was continuous and if it bore a relationship to the rate of uptake the calf was subsequently called upon to resist. It would appear that these mechanisms are delicately balanced and that the conditions on paddock A did not fulfil those required for the production of resistance, in that the sudden increase of infective larvae on the herbage was more than the calves could resist when compared with the small numbers experienced earlier. However, 1 calf did survive although it could hardly be said that it was resistant to the infection.

Calf 1010 which spent a period indoors while the herbage level was increasing rapidly was re-exposed at the peak of herbage infestation. Some of the worms from this second exposure evidently matured and a rise in faecal larval output occurred prior to death. At *post-mortem* examination surprisingly little lung damage was present and of the 286 worms recovered 5 per cent. were immature. It is difficult to say whether this calf was helped or hindered by its period indoors.

On paddock B the calves must have experienced a small uptake of larvae which declined after the carrier calves were removed and they were unable to resist the sudden heavy infection produced on the pasture by the larvae which they themselves excreted. These circumstances fit more easily into the picture presented by Michel (1957) who stressed that the uptake of larvae in the initial danger period must be continuous if resistance is to be developed. Calf 1014 on this paddock had 25 per cent. of its worm burden present as immature forms and located almost entirely in the trachea. This suggests that a preferential elimination of immature forms was taking place and some degree of resistance had developed, but the fatal damage had been done.

It is apparent from these observations that the conditions for translation were excellent in spite of the low rainfall in the summer of 1959. Probably of more importance was the lush growth of grass and the resulting loose consistency of the faeces, with their effect on the micro-climate.

These results emphasise the importance of carrier

(*Concluded at the foot of p.* 598)

Serum Calcium and Magnesium Levels in Ewes Following the Admission of Carbon Tetrachloride

BY

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SUMMARY.—Serum calcium and magnesium levels were followed in 18 lactating ewes given carbon tetrachloride by both the oral and subcutaneous routes. A fall in serum calcium of 13 per cent. was noted 96 hours after dosing but the mean fall in levels between 0 hours and 96 hours was not statistically significant. No significant change was found in the serum magnesium levels.

Introduction

IT has long been believed that a low serum calcium level will render animals more susceptible to carbon tetrachloride poisoning, and Pelckmann, cited by Clough (1936), found a decrease in blood calcium in horses poisoned with this drug. More recently, Gall (1955) reported that serum calcium levels were decreased by 15 per cent. in cattle and 23 per cent. in sheep following orally administered carbon tetrachloride, and Staskiewiez *et al.* (1955) found that the calcium levels of 10 sheep were lowered after they had been injected subcutaneously with 2 to 3 ml. carbon tetrachloride.

The purpose of the present communication is to record calcium and magnesium levels in lactating ewes which had been given carbon tetrachloride both orally and by injection.

Materials and Methods

Eighteen autumn-lambing ewes, which became pregnant following artificially induced ovulation were used for the investigation. Their mean parturition date was 10.11.59 (range : 7.11 to 13.11.59). They were grazing a ryegrass-clover ley and receiving a supplement of beet pulp and oats throughout the period of the investigation.

On 14.12.59, when lactation was considered to be at or near maximum, the ewes were bled for calcium and magnesium determination and half were assigned to " oral " and half to " injection " groups on the basis of live-weight. Each ewe in the " oral " group then received a 1-ml. capsule of carbon tetrachloride by mouth while each of the " injection " group was injected subcutaneously with a proprietary preparation containing 50 per cent. carbon tetrachloride at the rate of 0·125 ml. per kilogram bodyweight.

Fasciola spp. egg counts unfortunately proved too low to allow of any worthwhile evaluation of the drug.

Serum calcium and magnesium levels were determined on blood samples taken 24, 48, 96 and 192 hours after dosing, using the method of Kramer and Tisdall (1921).

Results

The results of the calcium and magnesium determinations are shown in Table I, and the number of ewes having a calcium level below 8·5 mg. per 100 ml. at the different times of sampling are given in Table II. Considering both groups together it will be seen that 96 hours after dosing, 13 ewes (*i.e.* 72 per cent.) had developed a level of calcium below 8·5 mg. per 100 ml. and at this time in all the ewes but one (No. 121) the calcium level was below that shown before dosing. In the case of No. 121 the level at 96 hours was lower than at 24, 48 or 192 hours but was not lower than the pre-dosing level. Again bulking the data from both groups 96 hours after dosing the serum calcium had decreased by 13 per cent., while the picture of the mean calcium levels was as follows :—

At time of dosing	*96 hours later*
9·11 ± 2·33 mg. per 100 ml.	7·88 ± 2·09 mg. per 100 ml.

t = 1·67 (34 d.f.)

Observations on an Outbreak of Parasitic Bronchitis.— *Concluded.*

calves which though excreting small numbers of larvae can under favourable conditions produce severe disease in susceptible stock. In this particular instance the carrier calves were vaccinated animals which had been out on infected pasture and it is clear that calves so treated cannot be regarded as free from infection and may constitute a danger to unvaccinated stock. The mixing of vaccinated and unvaccinated calves is contra-indicated and in any control measures based on vaccination all calves on the premises must be dosed.

The serological observations are in agreement with those recorded elsewhere (Cornwell & Michel, 1960). Antibodies were produced in response to larvae which were picked up while the herbage levels were undetectable and made their appearance in the serum about one week after the commencement of larval excretion.

Acknowledgments.—We are indebted to Professor E. G. White for his interest in the work and help in the preparation of this paper. These studies were supported by a grant from the Agricultural Research Council, and Allen & Hanburys Ltd. kindly supplied the " Dictol."

References

CORNWELL, R. L. (1959). *Vet. Rec.* **71.** 562.
———. (1960). *J. comp. Path.* (In press.)
———, & MICHEL, J. F. (1960). *Ibid.* (In press.)
JARRETT, W. F. H., JENNINGS, F. W., MCINTYRE, W. I. M., MULLIGAN, W., & URQUHART, G. M. (1957). *Vet. Rec.* **69.** 1329.
———, ———, MARTIN, B., MCINTYRE, W. I. M., MULLIGAN, W., SHARP, N. C. C., & URQUHART, G. M. (1958a). *Ibid.* **70.** 451.
———, ———, MCINTYRE, W. I. M., MULLIGAN, W., & URQUHART, G. M. (1958b). *Proc. Roy. Soc. Med.* **51.** 743.
———, ———, ———, ———, SHARP, N. C. C., & URQUHART, G. M. (1959). *Amer. J. vet. Res.* **20.** 522.
MICHEL, J. F. (1954). *Vet. Rec.* **66.** 381.
———. (1957). *Ibid.* **69.** 1181.
———, & PARFITT, J. W. (1956). *Ibid.* **68.** 706.
PARFITT, J. W. (1955). *Lab. Pract.* **4.** 15.

TABLE I
SERUM CALCIUM AND MAGNESIUM LEVELS (MG. PER 100 ML.)

Injection group, ewe No.	0 hours			24 hours			48 hours			96 hours			192 hours		
	Symptoms	Ca	Mg	Symptoms	Ca	Mg	Symptoms	Ca	Mg	Symptoms	Ca	Mg	Symptoms	Ca	Mg
14	Nil	9·0	2·2	Nil	8·2	2·3	Nil	7·7	1·6	Nil	7·7	1·5	Scouring; still feeding	8·6	2·1
3	,,	8·3	2·0	,,	8·7	2·3	,,	8·6	1·8	,,	7·7	1·8	Nil	8·4	2·5
27	,,	9·5	2·0	,,	9·7	2·1	,,	9·5	1·7	,,	8·9	2·2	,,	10·0	2·2
105	,,	9·3	2·0	,,	9·2	1·8	,,	8·6	1·4	,,	8·3	2·3	,,	9·2	2·2
181	,,	9·0	1·9	,,	8·5	1·5	,,	8·3	2·5	,,	6·5	1·5	,,	9·4	1·9
190	,,	8·8	2·0	,,	8·4	1·9	,,	7·7	1·6	,,	7·7	2·0	,,	7·7	1·8
121	,,	8·5	2·2	,,	9·4	2·5	,,	9·1	2·2	,,	8·7	2·3	,,	9·1	2·3
197	,,	9·2	1·8	,,	8·6	1·9	,,	9·1	1·4	,,	7·9	1·6	,,	8·1	2·2
182	,,	8·2	2·2	,,	8·2	2·0	,,	8·1	1·9	,,	7·6	1·9	,,	8·5	1·9
Means		8·9	2·0		8·8	2·0		8·5	1·8		7·9	1·9		8·8	1·1
Oral group															
155	Nil	9·4	2·0	Nil	9·2	2·1	Nil	9·0	1·7	Nil	7·5	1·8	Nil	8·9	2·0
182	,,	9·8	2·2	,,	9·1	1·6	,,	9·1	2·0	,,	7·7	2·2	,,	9·0	1·8
28	,,	9·4	2·1	,,	8·5	1·7	,,	8·8	2·2	,,	7·8	2·0	,,	8·6	2·0
26*	,,	7·6	1·7	Inappetance, dull	7·6	2·0	Still dull but improved	6·7	1·3	Much improved	5·8	?	,,	8·4	1·7
043	,,	9·9	1·5	Nil	9·8	1·5	Nil	9·3	2·0	Nil	8·7	1·8	,,	9·6	1·8
123	,,	9·5	2·2	,,	8·6	1·9	,,	8·7	2·2	,,	9·2	2·1	,,	8·7	2·6
23	,,	8·7	2·0	,,	8·7	1·9	,,	8·7	2·0	,,	7·2	1·5	,,	8·5	1·6
16*	,,	10·0	2·2	,,	8·6	1·8	Inappetance, dull	8·4	1·7	,,	8·4	1·9	,,	8·8	1·8
033	,,	10·0	2·2	,,	9·9	2·0	Nil	9·9	1·9	,,	8·6	2·2	,,	9·8	2·0
Means		9·4	2·0		8·9	1·8		8·7	1·9		7·9	1·9		8·9	1·9

TABLE II
NUMBER AND PERCENTAGE OF EWES HAVING A CALCIUM LEVEL BELOW 8·5 MG. PER 100 ML. AT THE TIMES OF SAMPLING

0 hours	24 hours	48 hours	96 hours	192 hours
3 (17 per cent.)	4 (22 per cent.)	6 (33 per cent.)	13 (72 per cent.)	4 (22 per cent.)

demonstrating that the fall in level though indicating a trend was not statistically significant.

No differences between the groups was apparent in the mean levels of calcium at any of the times of sampling. However, when the over-all fall in calcium occurring between 0 and 96 hours was calculated, the following facts emerged :—

	Mean pre-dosing Ca mg. per 100 ml.	Mean fall in Ca mg. per 100 ml.	Percentage difference
" Injection " group	8·9	0·85	9·55
" Oral " group ...	9·4	1·5	15·9

This would seem to indicate that a greater depression of calcium occurred in those orally treated than in those parenterally treated with carbon tetrachloride, though to what extent small individual variations which presumably occur from hour to hour may have operated in the production of this difference between groups is not known.

The only 2 ewes to show symptoms presumably associated with dosing occurred in the " oral " group (Nos. 26 and 16). These animals appeared dull and were not grazing 24 and 48 hours respectively after being dosed. While in the case of No. 26 this effect may have been due to hypocalcaemia at the time of dosing, no such explanation seems possible in the case of No. 16. In this connexion it is of interest that Edwards (1959) reported a mortality of 1·7 per cent. in orally treated lactating ewes as against 0·5 per cent. in those treated parenterally with carbon tetrachloride.

When only those ewes with an initially normal calcium level (*i.e.* 8·5 mg. per 100 ml. or more) are considered it will be seen that out of 15 there were 10 which developed hypocalcaemia 96 hours after dosing, the difference between their mean and 96 hours levels being highly significant, thus :—

At the time of dosing	*96 hours later*
9·26 ± 2·87 mg. per 100 ml.	7·67 ± 2·61 mg. per 100 ml.

$t = 5·78$ (19 d.f.)

A depression of calcium was noted, too, in those ewes whose initial level was below 8·5 mg. per 100 ml. In the case of one of these, No. 26, it is possible that a physiological adjustment took place resulting in the clinical improvement which was noted at a time when serum calcium had reached the rather low level of 5·8 mg. per 100 ml.

While serum magnesium levels appeared to be depressed following dosing in some cases, this effect was not significant.

With one or two exceptions, calcium and magnesium

(*Concluded at the foot of col. 1 overleaf*)

Obstetrics*

BY
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Stafford

THE subject of obstetrics is indeed a vast one, and as in any subject, the important thing is not so much having the knowledge as knowing where to find it. It would therefore seem pertinent to examine certain aspects in the field of human obstetrics and see what analogies can be made to veterinary obstetrics.

Human labour is divided into 3 stages.

The first or preliminary stage is the relaxation and ultimate dilatation of the cervix, brought about by a combination of passive hormonal relaxation and by active intermittent pressure of the so-called water bladder due to uterine contractions which occur approximately every 7 to 8 minutes in the early stages.

It is interesting to note that human first-stage labour may last for between 12 and 20 hours, and also to observe the variable behaviour of the average woman during this period. Many of them like to gossip ; they certainly like to have company. They may show a voracious appetite, and it is thought to be wrong to starve them during this period. The late Dr. Grantly Dick Read said that as great physical effort was going to be required it is only right that they should have plenty of sustaining food, and so, all during this first stage there is a tendency to gossip, sew, eat and behave perfectly normally. Women are not left alone during the preliminary phase because a word of explanation or comfort seems to help tremendously.

The first stage in the human comes to an end when the cervix is fully dilated. This would seem to need emphasis, as despite our generally accepted ideas it is a frequent occurrence in the smaller breeds of cattle for calves to be delivered when the cervix is only three-quarters dilated. However, to return to the story in the human being. As soon as the cervix is fully dilated acute pain develops in the back. This is probably the first real pain experienced and may on occasions lead to panic, but the pain tends to last for only 9 to 12 uterine contractions, although it may be accompanied by transient vomiting. This is a perfectly natural phenomenon because Nature demands an empty stomach for the violent physical effort which follows.

The second stage of labour now commences. The labour pains come on approximately every 5 to 6 minutes, and increase in severity. After a dozen contractions the pain in the back disappears due to the fact that the child's head is coming down through the pelvis, but another crisis develops when the head reaches the pelvic floor. As soon as the head of the baby comes in contact with the muscles of the pelvic floor there is a feeling of resistance which again may give rise to a feeling of fear and even unreasonable behaviour on the part of the mother. Associated with this behaviour an interesting change occurs in the relationship of the mother to her surroundings. Whereas in the first stage the tendency was for the

* Résumé of the paper presented to the Lincolnshire and District and the Northern Ireland Divisions of the British Veterinary Association.

Serum Calcium and Magnesium Levels in Ewes.—*Concluded.*

levels had returned to normal in both groups 192 hours after dosing.

Discussion

In interpreting the results of the present investigation, the normal variations in serum calcium that are known to occur in lactating ewes should be borne in mind. It might be argued that these normal variations could have been responsible for the depression of serum calcium occurring 96 hours after dosing with carbon tetrachloride. However, it would seem reasonable to suppose that this depression, resulting in hypocalcaemia in 72 per cent. of the ewes, was the result of some common factor and that the most likely factor was the administration of carbon tetrachloride.

The results differ from those obtained by Gall (*loc. cit.*) who found a decrease in serum calcium 24 hours after dosing.

While the results presented here suggest that considerably more information about the effects of carbon tetrachloride on serum calcium is needed before any definite conclusions can be stated, the evidence of lowering in the level of this mineral in lactating ewes following carbon tetrachloride administration is considered to be of interest. The question of a difference in effect depending on the route of administration would also seem to merit further investigation.

Acknowledgments.—The author would like to thank Mr. V. Vial, M.AGR.SC., for his help in carrying out the statistical analysis, and Mr. T. Kendrick for technical assistance. He would also like to thank Chemical Services, Ltd., Dublin, agents for Phillips Roxane, for the supply of injectable carbon tetrachloride.

References

EDWARDS, C. M. (1959). *Vet. Rec.* Emergency Edition, No. 3.
GALL, Z. (1955). *Veterinaria Sarajevo.* **4.** 402–43 (*Vet. Bull.* (1956). **26.** 647.)
KRAMER, B., & TISDALL, F. F. (1921). *J. Biol. Chem.* **47.** 475.
PELCKMANN, cited by CLOUGH, G. W. (1936). *Vet. Rec.* **8.** 551.
STASKIEWEIZ, G., JESZKIEWIEZ, T., & ROMANOWSKA, M. (1955). *Med. Vet. Varsovie.* **2.** 673–8. (*Vet. Bull.* (1956). **26.** 229.)

woman to want company, now there is an apparent amnesia between the contractions, the condition described by Dick Read as nature's anaesthetic, for the resuscitation of the body between labour pains. The woman may not hear when someone speaks to her, and during this phase absolute quiet is essential. The crisis due to the pressure of the head on the pelvic muscles can be combated by a real effort of bearing down on the part of the patient. The water bladder usually breaks at this stage and the strong bearing down advances the foetal head to the vulva, where another crisis arises. Instinctive fear that the woman may not be big enough to give birth to the baby may cause her to bear down heavily at the stage and lead to trauma, but under normal circumstances the potential mother will relax the bearing down as soon as the head reaches the vulva to allow uterine retraction gradually and slowly to dilate the vulva so that the head is "crowned."

It may take from half an hour to 3 hours for the delivery to be completed after the head is through the vulva, and this completes the second stage.

The third stage of labour is associated with the passing of the afterbirth. This is usually rapid and spontaneous, but the process may be speeded up by exerting pressure on the involuting uterus through the abdominal wall.

The accoucher's control factor in human labour is largely to let the natural processes take their own course, provided at all times that no signs of foetal distress become apparent, as indicated by the state of the foetal heart. This policy of non-intervention providing progress is being made by the mother and the foetus is showing no sign of distress might well be adopted as the guiding factor by all veterinary obstetricians.

It is interesting to consider the figures from the London Queen's Institute of District Nursing. In 1948, the last year figures were taken, some 69,330 women had babies, and of these 21·34 per cent. were primiparae with the balance 2nd, 3rd, 4th, 5th or 6th babies. Of these, the total that required any form of surgical interference or assistance was 2·3 per cent. for primiparae and 1·26 per cent. for multiparae, and the total mortality in both mother and child was 6·9 in 10,000 and not a single case of sepsis was recorded.

Now these are truly remarkable figures, and of course confirm the belief that providing presentation is normal surgical interference should only be resorted to when absolutely necessary, or even more dogmatically, only when the natural progress ceases.

A study of veterinary obstetrics over the last 10 years has led the author to a series of conclusions which may be of interest to record.

The Smaller Mammals

Obstetrical work in the smaller animals, rabbits, guinea-pigs, hamsters, rats and mice, is virtually unknown. All seem to reproduce with monotonous regularity and singular efficiency, although a case is known of a mouse which having gone 19 days over time, proceeded to deliver herself by nibbling through her flank, and performing an instinctive caesarean section. The basic underlying reason for this lack of obstetrical difficulties must surely lie in the fact that all these animals are allowed the privacy and freedom from interference so essential if natural conditions are to be simulated.

With the increasing popularity of the mink and chinchilla occasional cases of dystokia in these species are being recorded, but again these cases are comparatively rare because both the mink and chinchilla are normally allowed to give birth in privacy and quiet.

The Cat

In the cat, obstetrical problems are again uncommon. Why ? Simply because the cat is such a lithe creature, the kitting date is usually uncertain and the cat will almost invariably find a bed somewhere well away from human interference and get down to the job herself. In the author's practice during the past 3 years there have been only 9 obstetrical cases in the cat. The indications for caesarean section are very limited, and the capacity to stand up to prolonged labour quite extraordinary.

The Bitch

As far as the bitch is concerned, observations have given rise to a complete reorientation of ideas as to the normal parturition period. The prevailing idea that 12 hours is the normal time has proved in our experience to be far short of the fact, and the period is far more likely to be prolonged to 2 or even 2½ days.

This has been conclusively confirmed in a kennel where there are 60 field trial spaniels. Up to 2½ years ago the kennel had a history of extremely high mortality in puppies due, according to the owner, to an incidence of uterine inertia in over 75 per cent. of the whelping bitches. The whelping routine was stereotyped. If no progress was made by the bitch after 3 to 4 hours, then forceps delivery was attempted. If the puppy was alive all was well, and if dead it was assumed that the dead foetus was delaying parturition. The mortality rate of the puppies was over 50 per cent. and the indications for caesarean section frequent due no doubt to the oedema produced by premature forceps interference.

When the kennels came under our veterinary supervision we decided to go to great lengths to instruct the owner in the signs of normal labour. Once the preliminary signs of bed making, panting and resting became apparent, the bitch was placed in a draught-proof insulated whelping box within the main kennels and observed without interference. No direct aid was to be given until a dual examination had been made. The results speak for themselves. The puppy mortality rate has gone down to less than 10 per cent. The maternal troubles of inertia and metritis have ceased to exist, and never once have forceps been used nor caesarean section performed. The total parturition time has averaged out at approximately 36 to 54 hours. Since this experience we have put our findings into general use and as a result, forceps whelping and caesarean section in bitches are comparatively rare occurrences. The only real indication is dystocia early in labour when caesarean section may be performed to prevent death of the bulk of the litter due to prolonged labour.

One further example to illustrate this point. A fat maiden bitch which had been accidentally mated

produced 2 live puppies after a preliminary labour of 36 hours. When examined it was obvious that there were at least 3 more puppies in the uterus, a finding which was confirmed by X-ray examination. While the X-ray plate was being developed the bitch produced one more live puppy. Owing to the extreme obesity of the patient it was decided that any form of surgical interference would be unwise. No further signs of labour were apparent and so she was kept under an antibiotic cover until in a further 76 hours second-stage labour was resumed and the remaining 2 puppies were born alive.

The Sow

Obstetrical interference is rarely indicated in the sow. The introduction of a hand into the pig vagina produces oedema which retards the whole natural process. Occasionally it may be necessary to give assistance when uterine inertia supervenes towards the end of farrowing, especially in the old sow, but even in these cases farrowing is frequently completed spontaneously once the animal is allowed time to regain strength. Plenty of time and patience is the keynote to obstetrics in the sow, with the daily administration of antibiotics where emphysematous piglets are suspected.

The Sheep

The same principles are now being adopted throughout the whole world in obstetrical work with sheep. It is normally perfectly safe to leave an ewe in labour for 8 to 12 hours before examining it, although as in any species it is impossible to generalise completely and cases where the foetal head is presented at the vulva and no progress is being made obviously call for attention.

Since the publication of a previous article (Straiton, 1957) we have encountered a few cases of apparently true ringwomb. A very high proportion of suspected ringwomb cervices do relax if left for 24 hours, and by this time if partial relaxation has occurred it is then often possible to dilate the cervix by hand to its full extent. In these cases it is advisable to institute antibiotic therapy after the first examination, as failure of cervical dilatation is often associated with dead lambs.

One thing is certain, caesarean section in the ewe is indicated much less frequently than is generally accepted, and in the Midlands the indication is primarily in selected cases of pregnancy toxaemia, followed by genuine ringwomb and the odd foetal monstrosity.

Cattle

According to Monro Kerr, extremists retard progress. Changing experiences and thoughts, if contrary to the generally accepted pattern, are often considered extremist, but if they stimulate new thought then they can do nothing but good in the long run.

The idea that a calf must be brought into the world at all costs irrespective of the methods used and of the damage inflicted on the maternal genital tract was all too frequently adopted by our forebears. To such ends forced traction and the use of a multiplicity of weird obstetrical instruments was resorted to, and obstetrics was reduced to the common denominator that given sufficient endurance and determination to stick at a calving case, one would eventually win through.

In 1944, in an attempt to reduce the necessity of inflicting the undeniable suffering that this approach must cause, the logical answer seemed to be caesarean section, and in 1945 an article was published showing the results obtained with this method (Straiton, 1945) which were reasonably satisfactory, although the post-operative fertility of little over 15 per cent. was far from good. However, the operation proved a wonderful practice builder, and the number of caesarean sections became embarrassingly high. A medical friend who was asked for advice on the subject related the following true story. In Glasgow University during his student days there were two distinct schools of thought in the obstetrical field, those who believed in forceps and those who preferred to wait. The Professor of Midwifery had decided views on the subject. "Gentlemen," he would begin, "there should only be one set of obstetrical forceps, and they should be kept locked in the vaults of the City Hall so that when a doctor has a case which he thinks requires forceps delivery of the child he will have to apply to the Lord Provost. He in turn will have to take up the matter with the City Council. Then, gentlemen, after 3 or 4 hours debate, if permission is granted the doctor will have to seek out the janitor, and he in turn will have to find his keys. Then by the time the forceps are safely delivered into the hands of the doctor, 999 out of 1,000 women will have produced the baby by themselves."

Bearing all this in mind, it now seemed logical to study birth in cattle under normal conditions, and the most striking outcome of this study was the fact that normal parturition took considerably longer than was generally thought, especially in the British Friesian, and that in cases where the presentation was normal, results were infinitely better if no premature assistance were given unless progress ceased.

The most difficult part of incorporating this principle into our normal obstetrical procedure was the re-education of our clients. Once this was achieved our results exceeded our wildest expectations. Our routine advice has been for the farmer to make a vaginal examination after 2 to 4 hours of intensive labour. If the presentation is wrong we are called in immediately. We correct the presentation and then leave or assist depending on the degree of cervical dilatation. If, however, the farmer can feel 2 feet and a head he makes the patient comfortable on a non-skid floor and leaves her for a further 12 hours. At the end of this time the vast majority have calved, but if not, he sends for us again.

By adopting these methods we have achieved the following :—

1. Reduced the mortality rate in calves during the first 16 hours of labour, remembering that the vast majority of cattle will calve within this 16-hour period. To meet the only worth-while criticism of our methods, the delay from 16 to 28 hours admittedly

(*Concluded at foot of adjoining column*)

Opening of New Laboratories at the Wellcome Veterinary Research Station, Frant

The Rt. Hon. Lord Hailsham, Lord Privy Seal and Minister for Science, opened officially the new laboratories of the Wellcome Veterinary Research Station at Frant on Friday, July 15th. A large gathering representative of the veterinary, agricultural and kindred sciences was present and among those members of the profession present were: Mr. J. A. Anderson, Mr. A. G. Beynon, Mr. D. Buntain, Mr. F. A. Crowhurst, Mr. C. V. Dayus, Dr. W. S. Gordon (Director of the Agricultural Research Council Field Station, Compton), Mr. H. E. Harbour, Mr. H. F. Hebeler (Senior Vice-President of the B.V.A.), Mr. S. F. J. Hodgman, Mr. L. Hughes, Mr. L. E. Hughes, Mr. J. M. Ingram, Mr. J. S. J. Lauder, Mr. W. H. Parker, Dr. J. S. Paterson, Professor L. P. Pugh, Mr. J. N. Ritchie (Chief Veterinary Officer), Mr. P. M. F. Sambrook, Dr. R. Scarisbrick, Mr. G. F. Smith, Dr. A. W. Stableforth (Director of Veterinary Research, Central Veterinary Laboratory, Weybridge), Mr. P. M. Sutton, and Dr. W. R. Wooldridge (Scientific Director of the Animal Health Trust). The Registrar of the Royal College of Veterinary Surgeons, Mr. W. G. R. Oates, was also present.

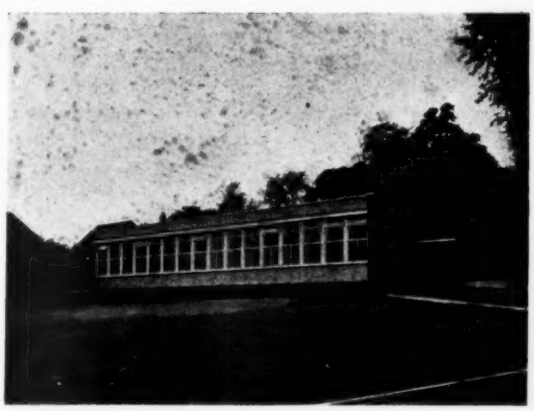
Mr. S. L. Hignett, President of the B.V.A., who is, of course, the director of the Research Station, and Mrs. Hignett, were hosts for the occasion. Mr. M. W. Perrin, C.B.E., Chairman of the Wellcome Foundation, presided.

In welcoming Lord Hailsham Mr. Perrin expressed his Company's appreciation of the honour done to them by his presence, by that of four members of the Wellcome Trust—among whom he named particularly Sir Henry Dale—and by the distinguished company gathered together that day. He referred to the recently forged link with Messrs. Cooper, McDougall, and Robertson, and expressed his gratification that this association was proving so harmonious. The new laboratories which Lord Hailsham had come to open were evidence of the Foundation's determination to expand its interests in the veterinary field and he felt that Mr. Hignett was the person uniquely qualified to describe that interest in detail.

Mr. Hignett, having referred briefly to his association with the Research Station since its inception, went on:—

"We are more concerned to-day with the research function of the Station. The work is largely of an applied nature, carrying forward into the farm animal realm the more fundamental studies undertaken at the Wellcome Research Laboratories at Beckenham and the Wellcome Laboratories of Tropical Medicine in London. During the years since 1943 we have been engaged in many fields but have been especially interested in mastitis in the dairy cow, in reproductive disorders in various species of domestic animals, and in worm infestations in livestock.

"Very few in this company need to be reminded of the economic importance of mastitis in the dairy cow. . . . We are proud to think that this Station played a material part in the work on this condition and to recall that it was on the basis of investigations here that the collapsible tube single dose udder



The new suite of laboratories at the Wellcome Veterinary Research Station, Frant.

Obstetrics.—*Concluded.*

causes a rise in calf mortality up to 30 per cen., butt of course the dam is unhurt and rarely exhausted. From 28 to 40 hours the mortality rises to 40 per cent. and beyond this time it may rise to 90 per cent. but nevertheless, the dam is invariably undamaged provided progress is being made. This rise in calf mortality after 16 hours is due simply to gradual progressive separation of the cotyledons, and we make it clear to the client that there is a danger of losing the calf, but at the same time point out the benefits to the dam of delayed interference. If some reliable method could be used for diagnosing the onset of foetal distress so that assistance could immediately be given then calf mortality could be reduced to a minimum.

2. Reduced maternal mortality to practically nil and at the same time safeguarded her future breeding potential.

3. Given up all forms of forced traction except in the case of the putrefying calf.

4. Reduced the need for complicated embryotomy.

5. Limited the indication for caesarean section to irreducible uterine torsion or gross foetal monstrosities.

The best way to sum up is to say that in cases of dystocia due to apparently oversized calves, by generally adopting the practice of patient observation and only intervening when maternal progress ceases or when foetal distress becomes apparent we have completely reorientated our ideas about the bovine capacity for labour, to the mutual benefit of ourselves and our patients.

References

STRAITON, E. C. (1945). *Vet. Rec.* **57.** 321.
———. (1957). *Ibid.* **69.** 395.

injection technique was introduced—later to become adopted on a world-wide scale.

"Perhaps it was work on infertility in cattle which was mainly responsible for the build-up of the reputation which so quickly followed the establishment of the Station. In the intervening years we have been able to contribute much to a better understanding of herd infertility problems.

"In the field of helminthology we were especially attracted to the problem of nematodiriasis. . . . In 1958, after much work with colleagues in the Foundation, we discovered the quite remarkable efficiency of "Frantin"—its ability to clear almost 100 per cent. of both the larval and adult stages of *Nematodirus* from the gut of lambs. We were able to find a dose level which, without any risk of side-effects, changed the scouring dehydrated infested lamb to a thriving animal within the space of a few days. Later a regime of dosage was elaborated which prevents the appearance of the disease. To-day the terror of nematodiriasis has been removed.

"In our work on parasitic bronchitis in cattle—"husk" to the agricultural community—we had the collaboration of one of the officers of the Ministry of Agriculture's Veterinary Investigation Service, Mr. W. H. Parker of Wolverhampton. Out of it has come "Franocide.". . .

". . . The determination of the Foundation to extend its interest in the veterinary field led it to provide increased facilities to assist the search for new chemotherapeutic drugs. As part of that programme there has been erected on the Station a new suite of laboratories with ancillary animal houses and a *post-mortem* room. These are designed expressly to provide the opportunity to obtain a better understanding of the nature of disease in livestock and to test out prophylactic and remedial measures. . . ."

At the close of his speech, which was received with loud applause, Mr. Hignett introduced Lord Hailsham.

Lord Hailsham, Lord Privy Seal and Minister for Science, with (from left to right) Dr. D. W. Adamson, Research Director of the Wellcome Research Foundation Limited; Mr. M. W. Perrin, Chairman of the Wellcome Foundation; and Mr. S. L. Hignett, Head of the Wellcome Veterinary Research Station, Frant.

The Minister spoke in warm terms of the Wellcome Foundation, an organisation, he thought, which combined in a unique degree the activities of a great commercial enterprise with liberal patronage of science and other forms of learning. It was his view that the quality of a commercial undertaking could be judged, in large measure, by its research activities and in that field the reputation of his hosts of to-day stood high. As Minister of Science he would like to see a large increase in the number of scientific laboratories run by commercial companies.

He referred to agricultural activity on his own estate and said how grateful he had cause to be for the work done at Frant, mentioning in particular the Station's successful research into the conditions of husk and of mastitis.

Lord Hailsham then declared the new laboratories open.

Dr. R. F. Montgomerie, the Foundation's Director of Veterinary Research, thanked Lord Hailsham in a deliciously characteristic speech and presented him, on the Company's behalf, with a silver replica of a jersey cow (a breed in which his Lordship is interested).

After the opening ceremony the guests adjourned to luncheon. Like the rest of the arrangements it could not have been bettered: "a wery good notion o' a lunch indeed," as Sam Weller said of Mr. Wardle's effort in the same field. Afterwards, conducted tours of the estate enabled everyone to see a number of excellent demonstrations of laboratory and field work.

GARDEN FETE IN AID OF THE V.V.B.F.

A garden fête held at "Highwood" Gifford, the residence of Professor and Mrs. Mitchell, in aid of the Victoria Veterinary Benevolent Fund, on Saturday, July 9th, realised the sum of £66 14s. 5d.

GIFT TO THE R.C.V.S HISTORICAL LIBRARY

Mr. F. C. Holliday-Pott, M.R.C.V.S., of Kingston-upon-Thames, has presented a copy of the first edition of "A Compendium of Anatomy, Physiology, and Pathology of the Horse" by B. W. Burke (London, 1806) to the R.C.V.S. historical library.

Sir Frederick Smith in his "The Early History of Veterinary Literature and its British Development" states that this work was largely a transcript of lectures delivered by Coleman, the Principal of the Royal Veterinary College. Smith adds that the only original part is a chapter on Cruelty to Animals. Mr. Holliday-Pott has informed the Registrar of the Royal College that the book was given to him by a very old man whose father had trained race-horses, and who was said to have been given the book by Burke himself.

Members of the College may often be in a position to obtain historical works of great value to the archives of the profession, and they are asked to bear in mind that, like the present work, they may usefully fill in the gaps of veterinary historical knowledge.

News and Comment

UFAW SUMMER CONGRESS

The UFAW Summer Congress will be held this year at Culham College, Abingdon, Berks., on the River Thames a few miles south of Oxford, and will take place from September 16th to 22nd, 1960.

The programme will include a visit to the Radiobiological Research Unit, Harwell, and also a variety of other visits, lectures and discussions, and a film show on various aspects of the welfare and husbandry of animals. There will be many opportunities for boating and other social activities.

The annual general meeting of the veterinary section will be held on Sunday, September 18th, and this will be addressed by Mr. Sydney Jennings who will speak on "Commerce *versus* Animal Welfare."

Fees, which include full board, single bedroom and all expeditions, will be £6 10s. for seniors and £3 10s. for students. Part-time visitors will be charged *pro rata*. Enquiries and applications should be made to UFAW (Summer Congress), 7a, Lamb's Conduit Passage, London, W.C.1. All bookings should be accompanied by a deposit of 10s. which is returnable on cancellations made before August 16th, 1960.

VETERINARY TELEVISION TALK

We once again print details of the television talk by a veterinary surgeon which is to be given in the B.B.C. Sunday farming programme for the benefit of those members of the profession who may not be able to watch the talk but who may be questioned about it by their clients. The transmission takes place on July 24th at 12.40 p.m.

The subject of the talk is the handling of cattle both in the cowshed and during simple veterinary operations. The veterinary surgeon will mention methods of restraining cows during operations for a ripped udder or teat and during drenching. In the case of the latter he will mention particularly that the head should not be pulled too far back. He will then show how to remove an obstruction from the cow's throat and how to remove chaff from its eye in safety.

Having dealt with ways of roping cattle around the head, he will then go on to discuss the behaviour of cows in the cowshed, describing right and wrong ways of driving them. In this connexion he will recommend that a link of the cow's chain should be replaced by a piece of string to prevent the cow from hanging herself should she fall. Combined with this precaution he will discuss the floor and the "non-skid" properties which it should possess. In case the cow should fall, the veterinary surgeon will describe how to tie her legs to prevent them straddling and causing unnecessary damage. Before leaving cows he will show how to hold up the hind leg during examination, recommending the method which employs a thick, well-padded bar and 2 men in addition to the surgeon. He will also mention the use of a rope in this context, but he will suggest that it should not be used unless absolutely necessary.

He will then go on to the method of catching "stirks" by catching one ear and the lower jaw and pushing the head backwards. Finally, he will recommend that heifers should be tied up regularly until they calve to accustom them to restraint.

Members may be interested to note that the profession is once more being honoured by having the whole of the 30-minute programme.

PIDA PILOT SCHEME FOR PERFORMANCE TESTING OF YOUNG BOARS

The Pig Industry Development Authority has started a pilot scheme for the performance testing of young boars at the British Landrace Society's station at Stockton-on-Forest, Yorkshire.

Sixty boars of 4 different breeds—Large White, Landrace, Wessex and Welsh—are on test. Another 120 will join them within the next few weeks. All the boars have been bought especially for the purpose.

The objects of the scheme are to find the best techniques of housing, feeding and management for performance testing, and to compare the results of ultrasonic measurements in the living pig with the facts about the carcase found by dissection.

It is hoped to complete the pilot scheme in time to start performance testing on a large scale at Stockton-on-Forest early next year.

RESTRAINT OF PRACTICE

Some 3 years ago we published (*Vet. Rec.* **69.** 757) details of B.V.A. policy on restraint of practice under the heading "Partnerships in Veterinary Practice." The paragraph concerned included the following sentence: "If it (the restriction) is held by a Court to be unreasonably wide, it will not be cut down to what is considered reasonable, but will be altogether void." Members of the profession may be interested in the following decision reported in full in *The Lancet* (July 9th).

The defendant, a Polish medical student, went to live with the plaintiff, a doctor, and his wife in 1951. After qualifying in April, 1952, he became assistant to the plaintiff and eventually, in November, 1953, the two doctors entered into a partnership agreement. The agreement provided that either party could determine it and contained a covenant that on determination the defendant would not take up practice in a private capacity either on his account or as a partner, assistant, or employee of a practitioner within 10 miles of the present practice. The defendant was not separately advised by a solicitor of his own.

At the date of the deed the patients of the practice numbered 2,275. Only 11 lived outside a 5-mile radius from the premises of the practice. Towns within the 10-mile radius included Oxford, Didcot, Wallingford, and Wantage.

The defendant determined the partnership in March, 1960, when he had some 1,000 patients on his list and his partner 1,800; he intended to set up practice about 2 miles away in Abingdon and Dray-

ton and the plaintiff took proceedings to restrain him in breach of the covenant.

The court said that a master was entitled to protect his trade secrets and trade connexion after the employment had ended; in some cases it was reasonable that the servant should be restrained from carrying on the same business in a certain area for a certain time, but the court looked at such agreements strictly. In this case, the plaintiff could have determined the agreement at any time, and the defendant would then have been forced to abandon the patients on his list either to the plaintiff or to some other doctor.

The court ruled that the covenant went far beyond what was strictly necessary, since there were substantially no patients ouside the 5-mile radius, and the action must fail.

ANNUAL LUNCHEON OF THE COUNCIL OF THE ROYAL SOCIETY OF HEALTH

The Annual Luncheon of the Council of the Royal Society of Health was held at the Grosvenor Hotel, Victoria, on Tuesday, July 19th, the principal guest being the Minister of Health, the Rt. Hon. Derek Walker-Smith, T.D., Q.C., M.P. In supporting the toast Dr. William G. Senior, C.B.E., Chairman of the Council of the Society, drew particular attention to the successful meeting regarding the broiler industry which had been held in the Southern Counties. He also stressed the vital necessity for clean food and in this regard the Society hoped to inaugurate a Clean Food Week next year.

Amongst the guests entertained at the Society's luncheon were the President of the British Veterinary Association, Mr. S. L. Hignett, Professor H. Burrow, Mr. W. Tweed, Mr. John Anderson, Mr. W. G. R. Oates, Registrar of the R.C.V.S., and Mr. H. W. J. Adams, secretary and bursar of the Royal Veterinary College.

NEW APPOINTMENTS IN NEW ZEALAND FOR GLAXO VETERINARY STAFF

Several members of Glaxo Laboratories' veterinary staff are being transferred this month to the Company's New Zealand subsidiary company at Palmerston North. They have been undergoing special training at Glaxo's Veterinary Research Unit at Greenford, Middlesex, preparatory to taking up appointments in new laboratories being built at Palmerston North for the manufacture of veterinary vaccines.

Glaxo plans to manufacture a wide range of veterinary vaccines in New Zealand and, later, in Australia.

Head of the New Zealand project will be Mr. D. Jull, B.SC., M.R.C.V.S., who qualified at the Royal Veterinary College, London, and in 1953 emigrated to New Zealand and joined the New Zealand Veterinary Services' Council Club scheme. With him will be Mr. R. French, as Chief Technician, Mr. P. T. Ryan, Mr. D. E. Post and Mr. J. Taylor.

Further staff will be recruited in New Zealand.

B.V.A. BOOKLET ON MEAT INSPECTION

There has just been published by the British Veterinary Association a small book entitled "A Guide to Meat Inspection." Its title is apt in that it presents in "*coup d'oeil*" form the essentials of meat inspection. It is not cluttered with a mass of descriptive detail and is therefore eminently suitable for quick and ready reference. The booklet can be carried in the pocket and may be consulted surreptitiously if need be. It has been written, primarily for practising veterinary surgeons, by veterinary surgeons who have considerable practical experience of meat inspection, and it is designed mainly to assist those practitioners who undertake meat inspection on a part-time basis.

Being intended for veterinary surgeons, the writers have taken for granted that the reader will be conversant with the symptomatology and pathology of diseases of animals, and they have assumed that those who want fuller information will consult one of the excellent text-books on meat inspection already available. The information in the Guide has been arranged under the following main headings:—

Ante-mortem Inspection

This section deals with the handling and inspection of animals prior to slaughter. It mentions some of the chief troubles which should be noted and the action which should be taken when these are found. It also contains a specimen form of certificate.

Post-mortem *Inspection*

In this section there is described briefly the technique for the *post-mortem* examination of animals intended for food. After some general instructions on the examination of the carcase, the conditions most frequently met are described in alphabetical order with guidance as to the action to be taken in each case. The position of the lymph nodes in the bovine and porcine carcase are described in the text and are shown diagrammatically. The conditions commonly encountered in each item of the offal are listed and, as a kind of cross index, there is an alphabetical list of these pathological conditions together with advice about the action to be taken. Specimen forms of certificate are given at the end of this section.

Laboratory Aids

Routine bacteriological, cultural and chemical techniques used in the laboratory are described in this section. These deal with the testing of material for the detection of various abnormalities—anthrax, undesirable odour, parasites, etc.—which are encountered in meat inspection.

Legislation

In this section meat inspection legislation in England, Wales and Scotland is described in straightforward language; all the Acts, Orders and Regulations relating to the slaughter and examination of animals intended for food are outlined. It informs the meat inspector of his powers, guides him in the action he should take in the various circumstances which may arise and warns him of the pitfalls he may meet.

All this information is contained in the 89 pages of a book which measures 6 inches by 4½ inches and is attractively and strongly bound. Its colour is designed to minimise any stains it may inadvertently collect. It should be in the hands of every veterinary surgeon and veterinary student because it is not only a valuable aid in meat inspection but should be a useful guide in ordinary *post-mortem* work. It is available for the modest price of 3s. 6d. to members of the British Veterinary Association and 12s. 6d. to others.

The inspection of poultry intended for food is not dealt with because it is a somewhat specialised task, and the writers wished to limit the size of the meat inspection guide. The British Veterinary Association is shortly issuing a new edition of the handbook on *Poultry Diseases* which will be most useful to those interested in the subject of the inspection of poultry.

THE REGISTER OF VETERINARY SURGEONS

The following gentlemen were admitted to membership of the Royal College of Veterinary Surgeons in virtue of the registrable degree of B.V.M.S. of the University of Glasgow on July 9th, 1960:—

Banks, Ian, 5, Lochview Road, Bearsden, Glasgow; Baxter, John Smith, 52, Young Terrace, Cowdenbeath, Fife; Begg, Thomas Ballantyne, 15, East Gate, Chichester, Sussex; Brander, Eric James Gordon, 7, Clashmack Drive, Huntly, Aberdeenshire;; Brown, Alistair Gibson, 23, Buchandyke Road, East Kilbride, Glasgow; Calver, Peter, Glenshian, Lochvinnoch, Renfrewshire; Campbell, Joseph, South Blair, Harthill, Lanarks; Harvey, Ian McKinlay, 32, Crichton Road, Rothesay, Bute; McLaren, Duncan Malloch, 50, Turnberry Road, Glasgow, W.1; Paul, Samuel Lilburn, Leighbank, Dublin Road, Newry, Co. Down; Reid, William John, 55, Busby Road, Clarkston, Glasgow; Robson, Bruce Alan, Beckley Farm, Tanfield, Tantobie, Newcastle upon Tyne, Northumberland; Rumford, Alastair Kay, 10, Millbrae Crescent, Langside, Glasgow, S.2; Shirkey, Ian Buchanan, 5, Moorside Street, Carluke, Lanarks; Wyllie, James Molyneux, 12, Mure Place, Minishant, Maybole, Ayrshire.

The under-mentioned gentlemen were admitted to membership of the Royal College of Veterinary Surgeons on the dates indicated, having passed the Final Examination for the Diploma of M.R.C.V.S.:—

Ahmad, Khawaja Rashid, c/o Khawaja Faqir Huhammad, Khazar Khan Wali Street, Jalal Pur Jattan, Distt. Gujrat, West Pakistan, July 11th, 1960, London, B.V.SC. (PUNJAB.); Aneja, Jagdish Singh, 55, Church Road, Acton, July 11th, 1960, London, B.V.SC. (PUNJAB.): Bhargava, Mohan Lal, c/o Sri K. C. Bhargava, 58A, Kamla Nagar, Delhi, 6, India, July 11th, 1960, London, B.V.SC. & A.H. (AGRA.); Farkas, George, 29 Frognal, London, N.W.3, July 11th, 1960, London; Kerekgyarto, Stephen Charles, 48, Kensington Hall Gardens, Beaumont Avenue, London, W.14, July 11th, 1960, London; Krudy, Elemer Stephen, 109, Inverness Terrace, London, W.2, July 11th, 1960, London; Sharda, Dharam Paul, c/o Atma Ram, Advocate, Sukh Ram Nagar, Ludhiana, Punjab, India, July 15th, 1960, Liverpool, B.SC., B.V.SC. & A.H. (PUNJAB.).

"RADIONIC" THERAPY

On Monday Mr. Justice Davies, giving judgment in the High Court for the designer of the "black box," Mr. George De La Warr, said that he was quite satisfied that Mr. De La Warr honestly believed in the efficacy of his instrument as a diagnostic method. Earlier his Lordship had said that he did not propose to spend a great deal of time on the *modus operandi* of the box, because there was a great deal of literature on the subject, and because according to the evidence of the witnesses it did not make much difference how one used the box; some used it one way and some another. No one had suggested that he knew how the box really worked; the standard nailed to the mast by Mr. Humphreys, counsel for Mr. De La Warr, was the famous phrase of Galileo spoken many years ago, with the slight alteration of one word: "But it works all the same."

Later in his summing up his Lordship mentioned the "telephone numbers" of the different parts of the body and the different diseases, and said that when it was pointed out that there were two or more numbers applying to one and the same organ or condition, the answer was that they referred to different aspects of the same thing; and when it was pointed out that there was one and the same number for two quite different things, the answer was that it was a mistake, but no harm could be done. Mr. Karmel, counsel for Miss Philips, had commented that if the wrong number could do no harm, how could the right number do any good? It was all part of the De La Warr optimism, commented his Lordship; if a thing worked, that was good; if it worked in the wrong way, that was interesting. It was possible that these people found difficulty in coming down to ground, where most of us had to live. There had been a marked lack of clear and logical thinking on the part of Mr. De La Warr and his associates.

His Lordship emphasised that he was certainly not deciding that it had been proved that the box did in fact work, either for diagnosis or treatment. On the evidence that was a very open question. Further, in his Lordship's opinion, in spite of the evidence of the witnesses for Mr. De La Warr on the question of the "radionic" camera, the totality of the evidence strongly suggested that the camera was completely bogus and that the photographs were fakes, but even if they were, his Lordship was quite satisfied that Mr. De La Warr believed in the camera no less than he did in the box.

UNIVERSITY NEWS

Bristol

The Council of the University has approved the appointment of Dr. T. K. Ewer, B.V.SC., Professor of Animal Husbandry in Queensland University, to the newly established Chair of Animal Husbandry in Bristol.

Although Professor Ewer was born and received his early education in England, he took his veterinary degree in Australia at Sydney University. He went to New Zealand as a Veterinary Research Officer but later came to the Institute of Animal Pathology at Cambridge as an Animal Health Trust Scholar, where he took the degree of Doctor of Philosophy. Since 1950 he has been Professor of Animal Husbandry in the University of Queensland. For some of this time he has been Dean of the Faculty of Veterinary Science in the University and also FAO Travelling Scholar in America, under whose auspices he has also spent some time in Burma.

At a Congregation held on the morning of July 6th the Vice-Chancellor conferred the degree of

B.V.Sc. on the students who were successful in the recent final examinations.

In the afternoon the President, Mr. J. N. Ritchie, C.B., admitted the new graduates to membership of the Royal College of Veterinary Surgeons. This ceremony took place at the Field Station at Langford, in the presence of friends and relations of the graduates, together with members of the staff. Following the ceremony, all present were entertained to tea.

THE ROYAL SOCIETY TERCENTENARY

Three hundred years ago, on Wednesday, November 28th, 1660, twelve men distinguished in "the new philosophy" met together after a lecture by Mr. (later Sir Christopher) Wren and it was agreed to form a "Society for the Promoting of Physico-Mathematicall Experimentall Learning," which was two years later formally constituted as "The Royal Society of London." Last Tuesday, July 19th, 1960, the tercentenary celebrations of the founding of The Royal Society were formally opened by the Queen at the Royal Albert Hall, London, when she said:

"I am delighted to be here as your patron on this great occasion to join in celebrating the Tercentenary of the Royal Society of London for improving Natural Knowledge. The main importance of this occasion is that we are celebrating the tercentenary of the oldest scientific society in the world. The Society has had an unbroken record of activity through three centuries and the contribution of the Fellows to natural knowledge is as great to-day as ever."

Her Majesty went on to outline the history of the Society from its foundation and to discuss the importance of the tradition of tireless curiosity which the Society has maintained in its work to-day. She pointed out that to the Society the only frontier is the frontier of knowledge. Saying how much pleasure it gave to all present to see so many distinguished names of science gathered together to do honour to the Society, Her Majesty ended by saying that she was sure everyone present would like to join with her in wishing the Royal Society all good fortune and success in the years ahead. She presented to the Society a silver bell as a token of her continued interest in their work.

After Sir Cyril Hinshelwood, O.M., F.R.S., President of the Society, had tendered humble and grateful thanks to Her Majesty on behalf of the Fellows, the ceremony concluded with the presentation of congratulatory addresses by the representatives of Italy, France, and Australia, and the formal admission to the Society of King Gustav VI Adolf of Sweden, who also tendered his congratulations and thanks. During the ceremony Sir Arthur Bliss conducted his composition "Salute to the Royal Society on the occasion of its Tercentenary."

The founding of the Royal Society in 1660 was remarkable in that it recorded the end of the moratorium on experiment and rational philosophy which the students of Aristotle had declared in our centres of learning: if Charles II were only to be remembered for one thing it would be that two years later he set the seal of royal approval on this revolutionary idea. Our own times are often far more cautious about the acceptance of ideas far less revolutionary. The history of the distinguished work of the Society through three centuries has recently been dealt with far more fully elsewhere and further comment would be redundant. Suffice to say that the B.V.A. adds its congratulations to those of other bodies, on the Society's splendid record of achievement. We are connected with the Royal Society through Professor E. C. Amoroso, PH.D., B.SC., M.B., B.CH., B.A.O., F.R.S., who was made an Honorary Member of the Royal College of Veterinary Surgeons some two years ago. On the editorial board of *Research in Veterinary Science* we are privileged to have Professor F. W. R. Brambell, D.SC., F.R.S.; Sir Alan Drury, C.B.E., M.A., M.D., F.R.C.P., F.R.S.; Dr. T. R. R. Mann, F.R.S.; and Professor C. Rimington, D.SC., F.R.S.

An illuminated address of congratulation was presented on behalf of the President and Council of the Royal College of Veterinary Surgeons to the President and Officers of the Royal Society, at Burlington House, on the morning of Monday, July 18th. The President and the Registrar of the College were invited to the Tercentenary Meeting at the Royal Albert Hall.

The programme of celebrations includes a series of lectures, visits to the Universities of Oxford and Cambridge and to research laboratories in and near London, and a service in St. Paul's Cathedral on Sunday, July 24th.—C.R.W.

PERSONAL

Births

BLANDFORD.—On July 4th, 1960, at the Baptist Mission Hospital, Banso, Southern Cameroons, to Sheila and Trevor Blandford, a son, Stephen James, a brother for Robert.

CUMMING.—On July 16th, 1960, to Ruth, wife of Gilmour Cumming, B.V.M.S., M.R.C.V.S., of Lathrisk, Millbank, Cupar, Fife, a daughter, Jane Cameron.

FRANCIS.—On July 17th, 1960, to Nancie (*née* Urmston) and Philip Francis, B.V.SC., M.R.C.V.S., 28, Wingfield Road, Trowbridge, a daughter, Alison Mary.

COMING EVENTS

July

26th (Tues.). Summer and Annual General Meeting of the Eastern Counties Veterinary Society at the B.O.C.M. Hobbs Cross Demonstration Farm, at 10.30 a.m.

29th (Fri.). Meeting of the Yorkshire Veterinary Society in the Royal Station Hotel, York, at 2.30 p.m.

August 28th to September 3rd. 78th Annual Congress of the British Veterinary Association in Glasgow.

September

21st (Wed.). Joint Meeting of the North Wales Division with local Branches of the British Medical Association for a Symposium on Brucellosis at the Imperial Hotel, Llandudno, 2 p.m.